Taxonomic studies on *Ptilotus* R.Br. (Amaranthaceae) in Western Australia

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Abstract

Benl, G. Taxonomic studies on *Ptilotus* R. Br. (Amaranthaceae) in Western Australia. Nuytsia 4 (3): 263-274 (1983). One new species and two new varieties of Western Australian *Ptilotus* are described and discussed: *P. procumbens, P appendiculatus* var. *minor* and *P. astrolasius* var. *luteolus*. The new species, only known from near Boulder in the Coolgardie Botanical District, is illustrated by analytical drawings of the flower; a photograph of the type specimen is provided. The *P. polystachyus* complex is discussed and clarified with the aid of figures and a key; *P. pullenii* Benl is reduced in rank to *P. polystachyus* var. *pullenii* (Benl) Benl and *P. polystachyus* var. *longistachyus* (W. V. Fitzg.) Benl is reinstated.

1. **Ptilotus procumbens** Benl, sp. nov. (Figures 1 and 2)

Planta annua humilis caulibus numerosis caespitosis, 3-10 (18) cm longis, mox procumbentibus, parce ramosis; primo leviter hirsuta denique plus minusve glabrescens. *Folia caulina* alterna (lineari-)lanceolata vel anguste obovata, ad c. 3 x 0.6 cm (basalia longe alati-petiolata maiora marcescentia), cuspidata. *Inflorescentiae* maturae (elongati-)conicae, ad 1.8 x 1 cm; *flores* 15-45, conferti, subcampanulati, primo purpurei dein viriduli, apicibus albidis glabris dentatis recurvatis tepalorum pilosorum (praesertim exteriorum) insignes; *bracteae* fuscae. Quatuor *stamina* fertilia; *filamenta* brevia in tubum staminalem longum transeuntia. *Ovarium* glabrum; *stylus* brevis crassiusculus.

Taxon novum a speciebus adhuc descriptis praecipue ob habitum procumbentem, ob inflorescentias conicas, structuram conspicuam tepalorum atque androecei recedit.

Typus: Kambalda Road, Boulder, Western Australia. "Low spreading (radially) herb, 10 cm. Flower spike pink-white." 19 Nov. 1978, *R. J. Cranfield* s.n. (holo: PERTH; iso: AD, CANB, K, M, MEL, NSW, PERTH).

The available specimens do not give evidence of a perennial habit. *Shoots* up to 50 (or more) arising from a central tap-root of up to 5 mm in diam., thick, at first erect, then spreading and soon becoming prostrate. *Stems* slender, weak, wiry, greyish-green with (slightly) angular reddish ribs which turn brownish red with age, clothed with curved to crumpled jointed hairs 1.2 mm long, indumentum ultimately restricted to apices and leaf axils; floriferous stems in large specimens (Figure 1A) ranging in length from 3 cm to about 10-18 cm towards the border of the rosette; longer stems weakly branched from upper leaf axils 1-3.5 cm apart, with flexuose to ascendent branchlets to 2.5 cm long whose apices always becomes peduncles and rachises of spikes. *Radical leaves* (10-20) elongate-spathulate, to 7 cm long and 0.7 cm broad, forming a rosette of up to 14 cm diameter, soon withering; *petiole* winged, about as long as the lamina. *Cauline leaves* c. 3-8 per stem, (08)1.3-2.5(3.2) cm long and about

Figure 1. *Ptilotus procumbens* Benl. A—Holotype specimen (*R. Cranfield* s.n., PERTH). B—Part of an isotype sheet (M). (Photograph K. Liedl).

2.5-6 mm broad, (linear-)lanceolate to narrow-obovate, slightly coriaceous, deep green on both surfaces, with a light brown excurrent point c. 1 mm long, midrib on lower surface prominent and dark coloured; *petiole* variable in length, flattened and somewhat winged especially in lower leaves, often undulate on margins when dry, villous only in young state with hairs as for stems. *Spikes* c. 10-50 per plant, always solitary, compact, terminal on stems and branchlets (Figure 1), lateral and subsessile in upper leaf axils when very young; initially upright then upturned at apices of procumbent stems and branchlets, at first ovoid-conical, 0.8-1.0 cm long, 0.7-0.8 cm wide (Figure 2A), at length oblong-conical, attaining fully 1.8 cm long and 1 cm wide. *Rachis* slightly zigzag, 0.3-0.5 mm diameter, densely tomentose, the hairs white and denticulate-nodose, shorter hairs crisp, longer hairs almost straight and 0.8-2 mm long, obscuring pedicels and basal part of flowers. *Flowers* 15-45 per spike; lowest flower on longer spikes sometimes up to 2 mm from base. *Flower-axis* articulate above bracteoles. *Bracts* and *bracteoles* concave, appressed to and 3/4 to more than 4/5 as long as perianth, ovate-lanceolate, tapering into acuminate points up to 0.5 mm long, shining inside, pilose outside with denticulate-nodose hairs 0.5-1.5 mm long, margins entire or weakly and irregularly dentate towards the apex. *Bracts* (2.6) 3-3.6 (4.2) mm long, 1.3-1.7 mm wide, semirigid, keeled, brown except basal portion, moderately pilose nearly throughout with the stiff hairs projecting to or somewhat beyond the tip (Figure 2B), brown bract colour finally giving the whole spike a dull greenish to greyish aspect. *Bracteoles* (2.4) 2.8-3.3 (3.8) mm long, 1.4-1.8 mm wide, thin and transparent, usually lustrous except for light brown and acuminate apical region, midvein inconspicuous, few hairs borne in central portion (Figure 2C), never surpassing tip, more or less evanescent with age. *Perianth* rigid, at first strictly erect but later subcampanulate through a curving outwards of exposed firm apices of tepals (primarily of the outer ones), reaching c. 5 mm long, forming with thickened bases of its segments (especially of the inner ones) a turbinate tube about 0.7-0.8 mm long, densely surrounded by a ring of 0.5-1.3 mm long hairlets; dorsal vestiture becoming sparser upwards but masking colour of tepals where not concealed by bracts. *Tepals* linear-lanceolate to narrow-elliptic, broadest above middle, limbate mainly in upper halves, membranous margins usually united towards the appendage-like apex (Figure 2D) and more or less incurved; three veins developed outside as bold ribs, midvein forming a 1.7-2 mm long faint keel above the tube, marginal ones bordering a coriaceous area, convergent higher up. Tepals not uniformly coloured: broad median area tinged purple fading to pink then viridescent, neighbouring scarious tissue keeping pink tinge longest then turning whitish, apical portion (of 0.5-0.8 mm) ivory-white throughout. Dorsal pubescence of tepals comprising straight subverticillate-nodose spreading hairs up to 1.7 mm long, indumentum covering the surface except the apex. *Outer tepals* (Figure 2D) 4.2-4.6 (4.9) mm long and up to 0.8-1.0 (1.1) mm wide when fully grown, involute and more or less abruptly narrowed on one or both sides c. 1 mm below obliquely truncate, dentate to denticulate and/or minutely serrate apex, projecting beyond pubescence and conspicuously bent outward (Figure 2A), completely glabrous within. *Inner tepals* (Figure 2E) narrower, 3.7-4.1 (4.3) mm long and (0.5) 0.6-0.7 mm broad, acute apex bent outward less than in outer tepals, somewhat obscured on outer surface but not exceeded by hairs inserted beneath; internally woolly at about middle, the hairs crisped faintly nodose c. 1 mm long and arising on one or both margins above the tube. *Androecium* and *gynoecium* markedly shorter than perianth. Four *stamens* consistently perfect; free part of *filaments* (0.4) 0.6 (0.7) mm long, c. 0.05 mm wide at middle, subulate above, basally dilated to about 0.2 mm; *staminode* equalling filaments of fertile stamens in length and shape, or somewhat thinner, often with a small appendix to 0.3 mm long or occasionally with a very rudimentary anther. *Filaments* and *staminodes* united with broad sinuses to a membranaceous glabrous tube (Figure 2F, G) to 1.2-1.4 mm long and

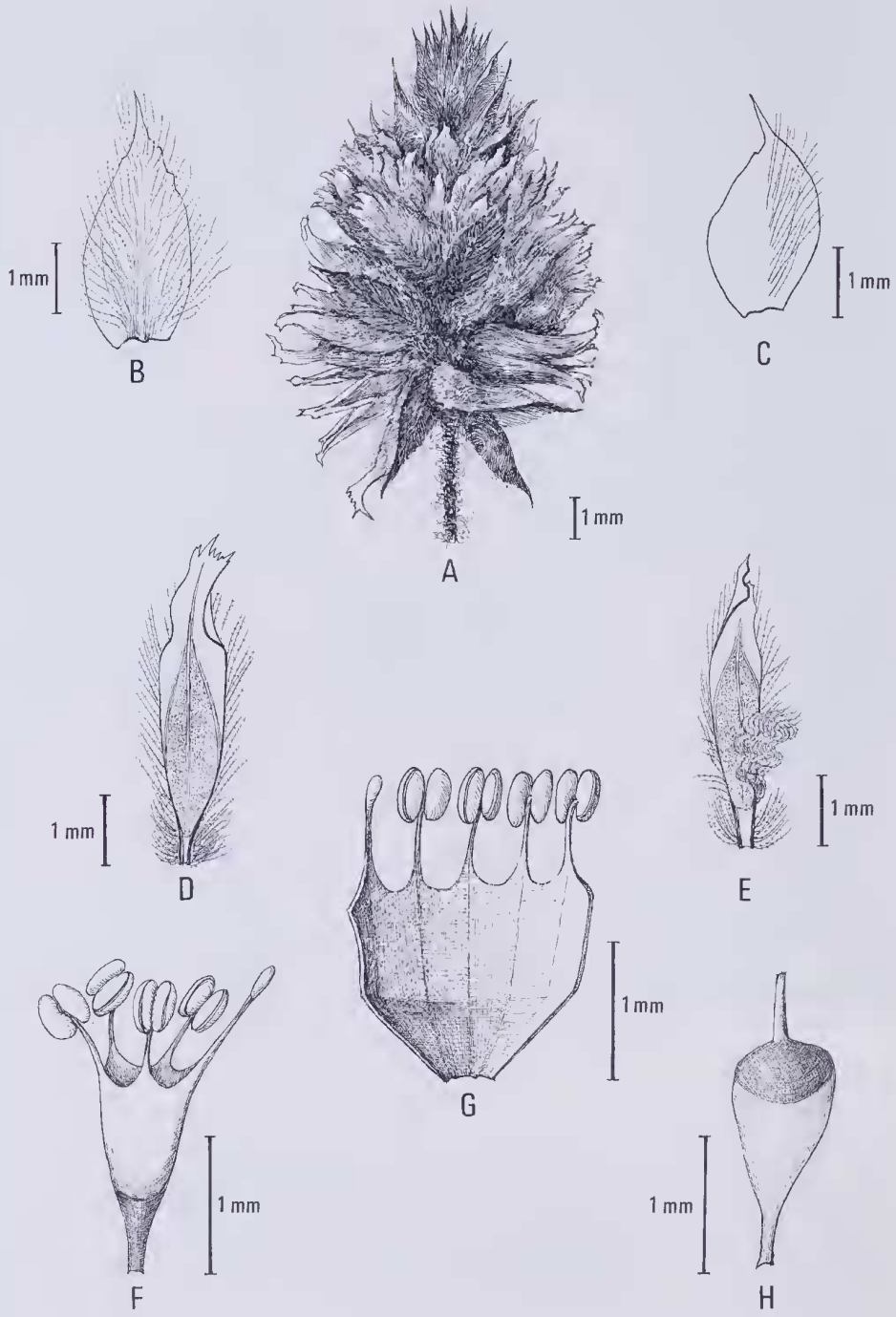

Figure 2. *Ptilotus procumbens* Benl. A—Spike. B—Bract, outer face. C—Bracteole, outer face. D—Outer tepal, inner view. E—Inner tepal, inner view. F—Androecium. G—Staminal tube opened. H—Gynoecium. (Drawn from holotype by A. Böhm).

0.5-0.6 mm in diameter, contracted and intimately adnate to perianth tube in lower 0.6-0.7 mm; *pseudostaminodes* absent. *Anthers* reddish when very young, golden to pale yellow at maturity, broadly elliptic, 0.4-0.45 mm long and 0.3-0.35 mm broad at anthesis. *Pistil* (Figure 2H) entirely glabrous, distinctly stalked when young. *Ovary* turbinate to subclavate, up to 1.6 mm long (including stipe of 0.6-0.7 mm) and 0.7-0.8 mm in diameter. *Style* subcentral, much shorter than ovary and relatively thick, 0.6 mm long by 0.1-0.12 mm diameter widening to 0.15 mm at base; *stigma* completely inconspicuous. Ripe *fruits* and *seeds* unknown.

Distribution. Known only from the type locality where it was collected on a "wash away in deep red clay". Its prostrate habit and unattractive spikes are perhaps reasons for it being overlooked by former collectors in this region.

Discussion. The newly described *Ptilotus* is sharply defined by its prostrate stems in addition to conical spikes, recurved appendage-like tepal tips and a markedly long staminal tube. An association of these characters clearly differentiates the novelty from all other forms and warrants specific recognition.

A staminal tube reaching more than twice the length of the perianth tube has been observed until now only in *P. auriculifolius* (A. Cunn. ex Moq.) F. Muell., Diels' "*Trichinium siphonandrum*". However, this species is an erect perennial with 'ear-shaped' leaves up to 16 x 6 cm. Constantly four perfect stamens also occur in *P. tetrandrus* Benl, but in this species the sterile stamen is aborted to a minute lacinia, furthermore the spikes are interrupted and the stems upright.

No closer affinities to any other *Ptilotus* can be established.

Ptilotus procumbens may be inserted in my key to *Ptilotus* species, in Mitt. Bot. München 9: 135-176 (1971), on p. 155 as follows:

45+ Inner tepals internally woolly 46

46 Bracts haired, brown
a Stems erect, cauline leaves up to 10 x 4 cm. Tepals in lower part with an unusual ridge crested by isolated hairs. Androecium with a minute free ring; ovary villous at top . . . . . .*P. carinatus* Benl
a+ Stems prostrate, cauline leaves up to 3 x 0.6 cm. Tepals without a crested ridge. Androecium with a long staminal tube; gynoecium glabrous. . . . . .*P. procumbens* Benl
46+ Bracts smooth and shining, almost uncoloured etc. *P. leucocoma* (Moq.) F. Muell.

2. **Ptilotus appendiculatus** Benl. var. **minor** Benl, var. nov. (Figure 3)

Differt a varietate typica praecipue habitu ramoso humiliore, inflorescentiis et omnibus partibus florum minoribus.

Typus: Boodardee, about 15 miles (24 km) W of Port Hedland, Western Australia. 9 Sept. 1969, *S. L. Everist* 9195 (holo: BRI 205778).

Diverging from the type variety of *P. appendiculatus* in its much-branched bushy growth and especially in smaller spikes with narrower flowers and less conspicuous appendages of the outer tepals.

Herb or *subshrub* with numerous branched prostrate stems forming close mats on ground surface. More or less bushy plant with a persistent indumentum. *Stem* c. 18 cm long, branches and floriferous branchlets growing sympodially more or less at right angles (thus somewhat resembling *P. obovatus* (Gaudich) F. Muell.). *Spikes* hemispherical or depressed-ovoid to 1.6 x 2.2 cm (hemispherical to elongate-ovoid and up to 4 x 2.6 cm in var. *appendiculatus*). *Bract* 4.2-5.5 mm long, *bracteoles* 5-

Figure 3. *Ptilotus appendiculatus* Benl var. *minor* Benl. Holotype specimen (*S.L. Everist* 9195, BRI). (Photograph K. Liedl).

5.8 mm long (4-7.5 mm and 6.5-8.2 mm respectively in var. *appendiculatus*). *Perianth tube* 0.9-1.3 mm long, (1.6-2.5 mm in var. *appendiculatus*). *Outer tepals* 10-10.9 mm long and 0.6-0.9 mm broad, with rhombic-obovate to -spathulate appendages of 2-2.3 mm long and 0.7-1.2 mm broad (in var. *appendiculatus* 11-13.2 mm long and 1-1.3 mm wide, appendages to 3.2 mm long and 2.5 mm wide; see Muelleria 1: 103, fig. 1, 1959). *Inner tepals* 8.8-10 mm long and 0.4-0.6 mm broad with an apex to 1.5 mm long by 0.8 mm broad (in var. *appendiculatus* 9.8-12.5 mm long and to 0.9 mm wide with a tip up to 1.5 mm long and 1 mm wide). *Stamens* unequal, mostly two adjacent ones fertile. *Filaments* 3.9-4.9 mm long (5-5.2 mm in var. *appendiculatus*). *Ovary* including stipe 3-3.3 mm long, almost entirely glabrous, the eccentric style 3-3.6 mm long (ovary including stipe in var. *appendiculatus* 4 mm long, sparsely pilose at summit, style 4 mm long).

Distribution. Known only from the type locality which is c. 350 km northeast of the most northerly known occurrence of the type variety.

Discussion. There is no reason to assume that the new taxon is merely a dwarf variant of the typical form of the species (up to 1 m across when trailing) grown on a more barren ground: according to the scanty records *P. appendiculatus* var. *appendiculatus* favours "spinifex hills", whereas var. *minor* was collected "in red brown alluvial sand on old flood plain between distributaries of Turner River."

Everist observed the "flowers white to pale ivory coloured". In collections of var. *appendiculatus* dating earlier (e.g. W. H. Butler, 9 Aug. 1963) the pink tinge of the tepals has been preserved up to the present; in more recent gatherings (e.g. R. Pratt 2/0119, 15 Aug. 1979) the collector described the flower colour as "purple, white and yellow". Thus a difference in colour may be an additional point of distinction between the two taxa.

The new plant diverges markedly enough in its habit from the type material of var. *appendiculatus* (Morrison 15098 in BM, E, K) to justify a subspecific rank. However, there are other collections of the typical form (e.g. W. H. Butler s.n., R. Pratt 2/0119), in which the branching resembles that of var. *minor*. Hence a varietal rank for the latter seems to be most appropriate.

3. **Ptilotus astrolasius** F. Muell. var. **luteolus** Benl & H. Eichler, var. nov.

A varietate typica imprimis colore plus minusve uniformi luteolo, floribus manifeste maioribus, bracteis bracteolisque (atro)fuscis, perianthio minus piloso distinguitur.

Typus: 8 miles (13 km) S of Meekatharra on Gabanantha Road, Eremaean Province, Western Australia, 22 Sept. 1957, *N. H. Speck* 884 (holo: CANB; iso: PERTH).

Diverging from the type variety of *P. astrolasius* especially in an almost uniform yellow colour, in having larger flowers, larger dark brown bracts, and a less hairy perianth.

Subshrub with young shoots and foliage densely yellow-villous, the hairs dendroid and up to 0.8 mm long. Fully developed *spikes* 12-17 mm long and 14-15.5 mm broad, conspicuous by glabrous shining apical portions of perianth, contrast between dull dark bracts and protruding lustrous yellow tepals particularly noticeable in a young inflorescence. *Bracts* usually 5 mm long, *bracteoles* up to 6 mm long, some-

times of the same colour. *Outer tepals* becoming 7.8 mm long and 2.5 mm wide; *inner tepals* (woolly bearded inside) averaging 7 mm long and 1.8 mm broad, length of claw very variable; stiff *hairs* from initially purplish claw of bipartite tepals comparatively short, thus leaving major part of tepal limb uncovered, hairs never arising on limb. *Filaments* and *style* to 3.2 mm long.

Other specimen examined. WESTERN AUSTRALIA: 6.4 km N of Mt Alice, Eremaean Province, "Basalt hill", *N. H. Speck* 1185 (CANB, PERTH).

Distribution. Speck's two collections both came from the southern region of the Ashburton Botanical District, Western Australia. These localities are about 400 km from the Hamersley Range, the nearest area known for the type variety. Thus there is no known overlap of ranges of the two varieties.

Discussion. At first glance the geographic separation and the significant differences (especially concerning colour of stems, leaves and bracts, size of floral organs as given in Table 1) between the two infraspecific taxa seem to justify their recognition as two subspecies. However, there is some variation in the colour of perianth and bracts and in the pubescence of tepals among the material of the type form (e.g. Parker 298, in AD, M, MEL, NT; Ashby 4166, in AD), which tend towards the corresponding features of var. *luteolus*. Therefore it seems more appropriate to give the new plant only the rank of varietas.

Table 1. Distinguishing morphological features between *Ptilotus astrolasius* var. *astrolasius* and var. *luteolus*.

Character	var. **astrolasius**	var. **luteolus**
Colour of shoots	Greyish or yellowish turning to light brown	Yellow
Colour of foliage	Hoary to greyish green turning to mid- and pale green	Yellow
Indumentum of young shoots and leaves	Mealy tomentose with a close layer of stellately branched hairs and fewer dendroid ones	Dense villous pubescence of dendroid hairs
Colour of spikes	Greenish- to greyish-white with fading reddish marks	Bicolorous with dark bract and yellow distal parts of the tepals
Bracts and bracteoles	Usually inconspicuous, bracts almost colourless, rarely brownish to deep brown, to 3 mm long; bracteoles to 3.3 mm long	Markedly conspicuous by their dull dark colour; bract to 5 mm long; bracteoles to 6 mm long
Outer tepals	To 4.9 mm long, to 1.6 mm wide	To 7.8 mm long, to 2.5 mm wide
Inner tepals	Mean = 4.2 mm long, 1.1 mm wide	Mean = 7 mm long, 1.8 mm wide
Claw	Somewhat longer than limb	Very variable in length
Length of filaments and style	To 2.3 mm	To 3.2 mm

4. Ptilotus polystachyus (Gaudich) F. Muell., Fragm. Phytogr. Austral. 6: 230 (1868), emend. Benl, Mitt. Bot. München 3: 517 (1960)—Figure 4.

From the very beginning there has been some confusion regarding taxonomy and nomenclature of *P. polystachyus*. Gaudichaud's short diagnosis of *Trichinium polystachyum* from Shark Bay (in Freyc., Voy. Uranie: 445, 1826) did not clearly characterize the species. Mueller's description of *Ptilotus polystachyus* included *T. stirlingii* Lindley and *T. roseum* Moq., both having been described in the meantime (see Bentham, Fl. Austral. 5: 225, 1870). Specimens of *P. stirlingii* at MEL were de-

termined by Mueller as *P. polystachyus*. Therefore, Mueller's concept of *P. polystachyus* had to be "emended" (Benl, l.c.) by excluding *P. roseus* (Moq.) F. Muell. and *P. stirlingii* (Lindley) F. Muell.

In 1838 Lindley (in T. Mitchell, Three Exped. Australia 2: 12) described *Trichinium alopecuroideum* which was separated by Bentham (l.c.: 218) from *T. polystachyum*, the latter being placed by him (l.c.: 225) into the affinity of *T. nobile* Lindley. *Ptilotus alopecuroideus* (Lindley) F. Muell. became the name for one of the most common mainland Australian species of *Ptilotus*, often appearing as a weed along roadsides in Western Australia. However, after comparing the type specimens of *Trichinium polystachyum* (holo: BM; iso: G,P) with the type material of *T. alopecuroideum* (holo: K) I stated in 1960 (Benl, l.c.) that the two taxa must be regarded as identical; thus the long-applied name *Ptilotus alopecuroideus* unfortunately had to be synonymized under *P. polystachyus*.

In 1918 W. V. Fitzgerald (in J. Proc. Roy. Soc. W. Austral. 3: 138) described a new species of *Ptilotus* from the Kimberley, Western Australia, naming it *P. longistachyus*. As there are intermediates between *P. polystachyus* and *P. longistachyus*, especially as regards shape and pubescence of the bracts, size of the bracteoles, development of the staminal cup and length of its hairs, the form of the ovary, insertion and hairiness of the style (Figure 4), *P. longistachyus* had to be reduced to the rank of variety (see Benl, Mitt. Bot. München 2: 403, 1958 and op. cit. 3: 518, 1960). Specimens showing intergradation in some floral details between the two taxa are: 14 miles (22.4 km) NE Dalmore Downs N.T., *G. Chippendale* NT 7340 (M, NT); Maxvale near Charleville Qld., 6 Dec. 1935, *E.H. East* s.n. (BRI); near Broome W.A., July 1911, *E. Mjöberg* s.n. (NSW). Finally *P. polystachyus* var. *longistachyus* (W. V. Fitzg.) Benl cannot be treated any longer as identical with the red-flowered form of var. *polystachyus*, as has been done incorrectly since 1962 (see Benl, Mitt. Bot. München 4: 282). The name is therefore now reinstated.

In 1979 I described *Ptilotus pullenii*. Having now been able to carry out a thorough revision of authentic material of *P. polystachyus* var. *longistachyus* (E, NSW, PERTH) it is clear that with regard to flower morphology *P. pullenii* must be regarded as closely allied to this variety. Therefore, *P. pullenii* is here reduced in rank to a variety of *P. polystachyus*.

Ptilotus polystachyus var. **pullenii** (Benl) Benl stat. et comb. nov. (Basionym *P. pullenii* Benl, Mitt. Bot. München 15: 169, 1979)—see 4f below.

The differences between var. *longistachyus* and var. *pullenii* are not confined to the colour of tepal tips (which are tinged red in the former variety but not in the latter). In addition there are other distinguishing features concerning the diameter of the spikes and especially the shape of their apices, the form, hairiness and midrib of the bracts. These differences are indicated in the key below and are clearly illustrated by a critical comparison of the specimens A. S. George 12813 (var. *longistachyus)* with D. Symon 5271 (var. *pullenii*) cited under 4e and 4f below.

Specimens examined.

4a.**Ptilotus polystachyus** (Gaudich) F. Muell. emend. Benl, var. **polystachyus** f. **polystachyus.**
WESTERN AUSTRALIA: Mt Anderson Stn., S of Fitzroy River, *R. D. Royce* 6916 (PERTH).

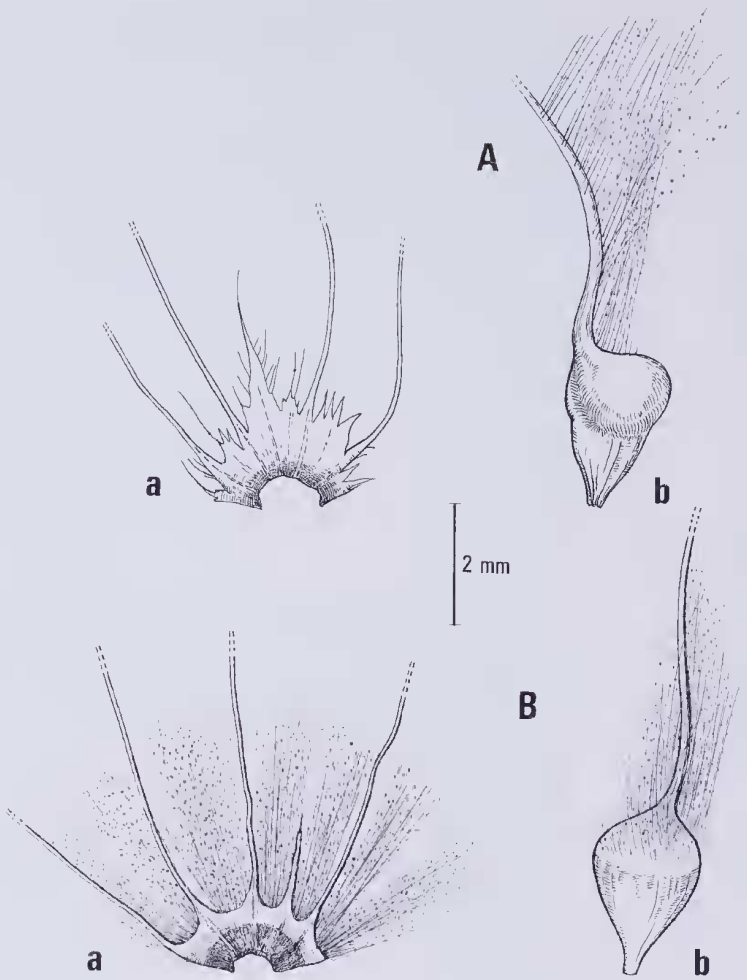

Figure 4. *Ptilotus polystachyus* (Lindley) F. Muell. emend. Benl. A—var. *polystachyus*: a—staminal cup spread open, inner view; b—ovary. B—var. *longistachyus* (W. Fitzg.) Benl: a—staminal cup spread open, inner view; b—ovary. (Drawn from *Hj. Eichler* 18880 (A), *Beauglehole* 54017 (B) by A. Böhm).

NORTHERN TERRITORY: Simpson Desert (24°18′S, 136°37′E), *P. K. Latz* 4613 (AD, CANB, NT).
SOUTH AUSTRALIA: Western edge of Pernatty Lagoon (31°27′S, 137°11′E), *Hj. Eichler* 18880 (AD, CANB, M).

4b. **Ptilotus polystachyus** var. **polystachyus** f. **rubriflorus** (J. M. Black) Benl, Mitt. Bot. München 4: 282 (1962).
NORTHERN TERRITORY: 40 miles (64 km) N of Wauchope Township, *M. Lazarides* 5843 (AD, CANB, M, NT, PERTH).
SOUTH AUSTRALIA: Oodnadatta (27°33′S, 135°27′E), Nov. 1914, *Miss Staer* s.n. (AD).

4c. **Ptilotus polystachyus** var. **arthrotrichus** f. **arthrotrichus** Benl, Mitt. Bot. München 7: 317 (1970).
NORTHERN TERRITORY: c. 80 km towards Borroloola from Daly Waters, *R. Pullen* 9323 (CANB).

4d. **Ptilotus polystachyus** var. **arthrotrichus**. f. **ruber** Benl, Mitt. Bot. München 15: 169 (1979).
WESTERN AUSTRALIA: Anketell Ridge (20°24'S, 122°07'E), *A. S. Mitchell* 1123A (NT, PERTH).

4e. **Ptilotus polystachyus** var. **longistachyus** (W. V. Fitzg.) Benl, Mitt. Bot. München 3: 518 (1960).
WESTERN AUSTRALIA: The Grotto, 2 km W of Great Northern Highway c. 30 km SSE of Wyndham, *A. C. Beauglehole* 54017 (CANB, M, PERTH); Montague Sound, *A. Cunningham* 201 (K); Usborne Harbour, Sept. 1839, *A. Cunningham* s.n. (K); Between Station Creek and Isdell River, *W. V. Fitzgerald* 1080 (E, NSW, PERTH); The Bastian, Wyndham, *C. A. Gardner* 7256 (PERTH); Near Gariyeli Creek, Prince Regent River Reserve, *A. S. George* 12813 (AD, CANB, K, MEL, PERTH); Boomerang Bay, Biggs Is., *N. G. Marchant* 72/25 (M, PERTH); Champagny Is., Bonaparte Archipelago, 27 May 1972, *P. G. Wilson* s.n. (PERTH); Osborne Is. (south west island), Bonaparte Archipelago, *P. G. Wilson* 11146 (PERTH); Cambridge Gulf near Wyndham, 1887, *H. S. Wright* s.n. (MEL).

4f. **Ptilotus polystachyus** var. **pullenii** (Benl) Benl, see above.
WESTERN AUSTRALIA: Dead Horse Springs, near Lake Argyle, *G. W. Carr* 3150 & *A. C. Beauglehole* 46908 (PERTH); Dead Horse Springs, Lake Argyle area, Ord River, *R. Pullen* 10669 (CANB, M, WIR); 3 miles (4.8 km) S of Ord River Crossing (64 miles (102.4 km) N of Halls Creek), *D. Symon* 5271 (ADW, CANB, M, PERTH); Kimberlite Pipe Gap, at head of Smoke Creek, SW of Lake Argyle, *A. S. Weston* 12314 (CANB, PERTH).
NORTHERN TERRITORY: Lat 12°40'S, Long. 133°15'E, *L. A. Craven* 2476 (BRI, CANB, M).

Key to taxa of the Ptilotus polystachyus complex

The situation regarding the *P. polystachyus* complex may be summarized in the following key:

1a. Staminal cup oblique, cleft, ciliate with few short hairs (Figure 4Aa); ovary subcompressed, gibbous (Figure 4Ab), hairs restricted to base of style which is provided in lower half with unilateral hairs to c. 4 mm long. Spike 1-4 cm in diameter; bracts soon glabrous, bracteoles to 6 x 4 mm. Leaves linear or lanceolate 2
b. Staminal cup low, (sub)symmetrical, with copious silky hairlets (Figure 4Ba) to 3 mm long, sometimes enveloping the ovoid ovary like a veil and joining with its pubescence which mainly arises from upper portion of the ovary (Figure 4Bb); bracts hirsute. Leaves (elongate-) spathulate. In Western Australia found north of 18° lat. only 3
2a. Stems and foliage sprinkled with crisped hairs, at length glabrescent var. *polystachyus*
(a) Fully developed spikes greenish turning brownish . . . . . 4a. f. *polystachyus*
(b) Fully developed spikes dull purple fading to brownish . . . . 4b. f. *rubriflorus*

b. Stems and foliage remaining completely tomentose-pubescent. Recorded from Western Australia between 17° and 22° lat. . . . . var. *arthrotrichus*
(a) Fully developed spikes greenish turning brownish . . . . . 4c. f. *arthrotrichus*
(b) Fully developed spikes red fading to brownish . . . . . 4d. f. *ruber*

3a. Spikes 1.6-2.3 cm across, with obviously narrowed apices unless fully grown; bracts mostly acuminate, with (broad-) dark midrib, bracteoles to 5 x 3.5 mm. Perianth pink tipped, becoming creamy to brown . . . . . 4e. var. *longistachyus*
b. Spikes 2.1-3 cm across, with roundish apices subconical when immature; bracts ovate-acute, usually with narrow rufous midribs, bracteoles to 4.5 x 3.5 mm. Perianth pale green becoming brownish 4f. var. *pullenii*

Note. Undoubtedly var. *arthrotrichus* is more closely related to var. *polystachyus* than are var. *longistachyus* and var. *pullenii*. However, intermediates in floral characters between the latter taxa and the type variety, even within the same collection (e.g. A. C. Beauglehole 54017, R. Pullen 10669), forbid application of different taxonomic ranks.

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